

REMARKS/ARGUMENTS

Claims 1-20 are currently pending in the subject application. Claims 1 and 11 are independent.

Claims 1-20 are presented to the Examiner for further prosecution on the merits.

A. Asserted Rejection of Claims 1-20

In the outstanding Office action, mailed April 6, 2005, the Examiner rejected claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,300,676 B1 to Kawai (hereinafter "the Kawai reference") in view of U.S. Patent Application Publication No. 2004/0035917 A1 to Koopmans (hereinafter "the Koopmans reference"). Applicants respectfully traverse this rejection, and submit that Examiner failed to set forth a *prima facie* case of obviousness. Applicants respectfully submit that the proposed combination of references is improper and fails to disclose or suggest all elements of the rejected claims for at least the reasons set forth below.

Claim 1 recites, in part:

- . . . (b) forming a structure layer . . . ;
- . . . (c) forming an under bump metal . . . ;
- . . . (d) forming a via hole in a glass substrate. . . wherein the glass substrate is bonded to the upper surface of the structure layer; and
- (e) arranging a solder ball in the via hole. . . .

Applicants respectfully submit that the proposed combination of the Kawai and Koopmans references fails to disclose or suggest all elements of claim 1.

In the outstanding Office action, the Examiner asserted that the Kawai reference discloses various aspect of claim 1, stating that Kawai discloses:

- . . . (b) forming a structure layer 2 . . . ;
- . . . (c) forming an under bump metal 22 . . . ;
- . . . (d) forming a via hole 21 in a glass substrate 3 . . .

The Office action of April 8, 2005, at pages 2-3, with reference to FIG. 6 of the Kawai reference.

The Examiner admits, however, that the Kawai reference fails to disclose arranging a solder ball in the via hole, as recited in claim 1. The Examiner asserts that the Koopmans reference supplies this missing teaching, stating that the Koopmans reference discloses:

. . . forming via holes 132 in a glass substrate 130 corresponding to the position of the under bump metal 122 of the structure layer 121 wherein the glass substrate 130 is bonded to the upper surface of the structure layer 121 and arranging solder balls 240 in the via holes 132. . .

The Office action of April 8, 2005, at pages 3-4, with reference to FIG. 1B of the Koopmans reference.

Applicants respectfully disagree, and submit that the Koopmans reference fails to disclose or suggest arranging a solder ball in a via hole of a glass substrate. Applicants first note that, while the Kawai reference is directed to manufacturing microelectronic devices, the Koopmans reference is directed to machines for manufacturing microelectronic devices. Thus, the proposed combination of elements from FIG. 6 of the Kawai reference with elements of FIG. 1B of the Koopmans reference combines the part itself with the machine for making the part. In particular, applicants note that the rejection equates “glass substrate 3” from FIG. 6 of the Kawai reference with “glass substrate 130” from FIG. 1B of the Koopmans reference. Reference numeral 130 in FIG. 1B of the Koopmans reference, however, indicates a stencil 130, which is part of a stenciling machine 180 used to manufacture microelectronic devices. (*See the Koopmans reference at, e.g., paragraph [0023]*).

Further, applicants respectfully dispute the assertion that a “glass substrate 130” is disclosed by the Koopmans reference. First, as noted above, stencil 130 is not part of a microelectronic device. Rather, it is part of a machine. Further, the Koopmans reference fails to disclose or suggest that stencil 130 is made of glass. Rather, the Koopmans reference discloses that the stencil 130 is preferably Kapton or a similar material so that the liquid

solder does not stick to the stencil 130. (*See the Koopmans reference at, e.g., paragraph [0028]*).

Finally, applicants respectfully dispute the assertion that “the glass substrate 130 is bonded to the upper surface of the structure layer 121.” Element 121 of FIG. 1B of the Koopmans reference is a dielectric layer 121 of a microelectronic device 100, while element 130 is a stencil of a stenciling machine 180. (*See the Koopmans reference at, e.g., paragraphs [0022]-[0023]*). Applicants respectfully submit that it would not be obvious to one of ordinary skill in the art to modify a microelectronic device by bonding it to the machine by which it is made. In any case, applicants respectfully submit that the Koopmans reference does not disclose bonding the stencil to the dielectric layer, and, indeed, discloses just the opposite. For example, the Koopmans reference discloses “the microelectronic workpiece 100 is moved in a direction D2 and released by the stencil 130” and “reflowing solder paste 140 before disengaging the microelectronic workpiece 100 from the stencil 130.” (*See the Koopmans reference at, e.g., paragraphs [0030]-[0031]*).

Thus, for at least the reasons set forth above, applicants respectfully submit that the proposed combination of the Kawai and Koopmans references is improper and fails to disclose, *inter alia*, arranging a solder ball in a via hole, as recited by claim 1. Accordingly, applicants respectfully submit that claim 1 is allowable.

Claim 11 recites, in part, “. . . disposing a solder ball in the via hole . . .” In the outstanding Office action, the Examiner rejected claim 11 over the Kawai and Koopmans references. The Examiner admitted that the Kawai reference fails to disclose disposing a solder ball in the via hole, but again asserted that the Koopmans reference supplies the missing teaching, in the same fashion as for claim 1. Applicants respectfully submit that the rejection of claim 11 is improper for at least the reasons set forth above regarding claim 1, and respectfully submit that claim 11 is allowable.

The remaining rejected claims depend, either directly or indirectly, from claims 1 and 11. Accordingly, applicants respectfully submit that they are allowable for the reasons set forth above.

Further, applicants respectfully submit that the rejection of many of the dependent claims is not supported by the assertions made in the outstanding Office action. For example, the Examiner rejected claims 2 and 12, asserting that the Kawai reference discloses the use of inductively coupled plasma-reaction ion etching (ICP-RIE) at col. 9, lines 23-43. The Kawai reference, however, does not appear to disclose ICP-RIE anywhere in the document. The Examiner rejected claims 5 and 15, asserting that the Kawai reference discloses removing an oxidation layer in FIG. 8. FIG. 8, however, does not appear to disclose an oxidation layer, or removing one. The Examiner rejected claims 6 and 16, asserting that the Kawai reference discloses removing an oxidation layer by printing a flux or by melting under an inert gas atmosphere without the flux at col. 9, lines 10-43. These cited lines, however, do not appear to disclose removing an oxidation layer. The Examiner rejected claims 8 and 18, asserting that the Kawai reference discloses forming an insulation layer of Cr/Au, Ti/Au, or Cr/Ni/Au alloy at col. 7, lines 16-64. These cited lines, however, do not appear to disclose any metals or alloys, nor is gold disclosed anywhere in the document. Similarly, the Examiner rejected claims 9 and 19, asserting that the Kawai reference discloses one of a number of gold alloys at col. 9, lines 44-59, when in fact, no gold alloys appear to be disclosed by the Kawai reference.

Therefore, it is respectfully requested that this rejection be withdrawn.

B. Conclusion

Since the cited prior art relied on to reject the claims of the subject application fails to anticipate or render obvious the present invention as recited in claims 1-20, applicants respectfully request that the rejection of claims 1-20 be withdrawn. Applicants submit that

these claims are now in condition for allowance, and a notice to that effect is respectfully requested.

Finally, applicants note the prior art documents made of record and not relied upon and the Examiner's comments regarding the relevance thereof. Applicants respectfully submit, however, that because the documents were not relied upon to reject any pending claim, no reply is required to these comments.

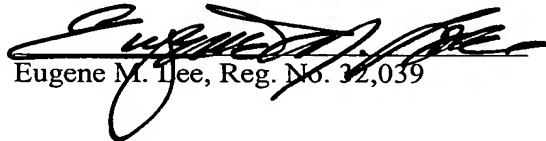
If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing remarks, reconsideration of this application is earnestly solicited, and an early and favorable further action upon all pending claims is hereby requested.

Respectfully submitted,

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PETITION and
DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, applicant hereby petitions the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.